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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/620,782

07/15/2003

Dirk J. Sundt

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09/23/2004

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EXAMINER

MAGEE, THOMAS J

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,782

Applicant(s)

SUNDT ET AL.

Examiner

Thomas J. Magee

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-41 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 25-41 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 07152003, 09152003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections – 35 U.S.C. 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 25 – 32 and 37, and 39 – 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Peidous et al. (US 6,027,982).

3. Regarding Claim 25, Peidous et al. disclose a semiconductor structure (figures 3 – 5) (Col. 3, lines 25 – 26) comprising:

a trench (35) formed in a substrate (31) Figure 5)

a first layer (33) of first material formed over the substrate and having a faceted (“having planes”) therethrough over the trench, and

a mask layer (34) formed over the first layer and having an opening therethrough over the opening of the first layer.

4. Regarding Claim 26, Peidous et al. disclose that the faceted opening of the first layer undercuts (L3 in Figure 5) the opening of the mask layer (34).

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5. Regarding Claim 27, Peidous et al. disclose that the first material comprises a silicon nitride layer
6. Regarding Claim 28, Peidous et al. disclose that the mask layer comprises a layer of silicon oxide material (Col. 3, lines 32 – 35).
7. Regarding Claims 29 and 31, Peidous et al. disclose that a layer of insulating material (40) (Figure 8) fills the trench.
8. Regarding Claim 30, Peidous et al. disclose a semiconductor structure comprising:
 - a trench (35) formed in a substrate (31) (Figure 5), and
 - a first layer of silicon nitride material (33) (Col. 3, line 31) formed over the substrate and having a faceted opening therethrough over the trench.
9. Regarding Claim 32, Peidous et al. disclose the presence of a pad oxide layer (32) (Col. 3, lines 28 – 29) interposed between the first layer (33) and the substrate (31), the pad oxide layer having an opening therethrough over the trench.
10. Regarding Claim 37, Peidous et al. disclose a semiconductor structure comprising:
 - a trench (35) (Figure 4) formed in a substrate (31),
 - a mask layer (34) having an opening therethrough and located over the trench, and
 - a first layer (33) interposed between the substrate (31) and the mask layer (34), the first

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layer having an opening undercutting the opening of the mask layer (34).

11. Regarding Claim 39, Peidous et al. disclose that the materials from which the first layer (33) and the mask layer (34) can be selectively etched with respect to one another (Figure 5) (Col. 3, lines 43 – 55).

12. Regarding Claim 40, Peidous et al. disclose that the mask layer (34) is formed from silicon oxide (Col. 3, lines 34 – 35).

13. Regarding Claim 41, Peidous et al. disclose that the first layer (33) is formed from silicon nitride (Col. 3, line 31).

10. Claims 33 – 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Huang (US 6,232,203 B1).

11. Regarding Claim 33, Huang discloses a semiconductor structure comprising:

a trench (8) formed in a substrate (10) (Figure 4a),

a first layer of silicon nitride material (14) formed over the substrate (10) (Col. 3, lines 5 – 6) and having a first side proximate to the substrate and a second side opposite of the first side, and further having an opening therethrough over the trench, the opening having a first dimension along the first side and a second dimension along the second side greater than the first dimension (See Appended marked-up Figure 4a).

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12. Regarding Claim 34, Huang discloses that the materials of the substrate (silicon) and first layer (silicon nitride) can be selectively etched with respect to one another (Col. 3, lines 17 – 27).

13. Regarding Claim 35, Huang discloses that the opening of the first layer is tapered (Figure 4a).

14. Regarding Claim 36, Huang discloses that the opening of the first layer (14) is faceted (Figure 4b).

Claim Rejections – 35 U.S.C. 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peidous et al., as applied to Claims 25 – 32 and 37, and 39 – 41 in view of Chiu et al. (US 6,265,317 B1).

17. Regarding Claim 38, Peidous et al. do not disclose an opening of a first layer on a substrate, wherein the opening has a first dimension along the first side and a second

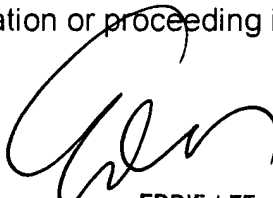
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dimension along the second side greater than the first dimension of the opening through the mask layer and also greater than the first dimension of the opening of the first layer. Chiu et al. disclose an opening through the mask (photoresist) layer having a first dimension (Col. 2, lines 58 – 61) (atop layer 51, Figure 5), a first layer (52) having a first side proximate to the substrate and a second side opposite the first side and an opening of the first layer having a first dimension along the first side (See Appended marked-up copy of Figure 5) greater than the first dimension of the opening through the mask layer and also greater than the first dimension of the opening of the first layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the procedures of Chiu et al. with Peidous et al. to obtain a controlled etch for forming the dielectric “masks” for trenches.

Conclusions

23. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to **Thomas Magee**, whose telephone number is **(571) 272 1658**. The Examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM (EST). If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, **Eddie Lee**, can be reached on **(571) 272-1732**. The fax number for the organization where this application or proceeding is assigned is **(703) 872-9306**.

Thomas Magee
September 8, 2004



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